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ber, but were resumed again in March 1882. The total number of nights on which this star has been observed is 42, namely:—

1881, November	13	1882, March	15
December	7	April	7

The star was near a maximum or minimum on the following nights:—

Near Maximum.	d	h	Near Minimum.	d	h
1881, Nov.	5	0	1881, Nov.	9	11
	15	6		20	6
	25	13		29	6
1882, March	3	8	Dec.	21	6
	13	8	1882, March	5	8
April	3	11	April	6	10

The star was also observed to be at a maximum on the evening of March 11, 1879. The following elements have been found to represent the observations very satisfactorily:—

Period $10^{\mathrm{d}}\cdot6747$

Variation from 2·2 to 2·8

Epoch of Maximum, 1882, April $4^{\mathrm{d}}\cdot10$.

The star's magnitude, for the greater part of its period, is 2·5 or 2·6. The minimum takes place two or three days after the maximum. Observations were also made by Mr. T. Read in November and December, which were found to agree with my own. The stars used as comparison stars were:—

α Ursæ Minoris	Mag. 2·4
γ „ „	3·2

The determinations were made with an opera-glass, the stars being placed slightly out of focus. The colour of *β Ursæ Minoris* is usually a bright yellow; it probably becomes redder at minimum.

Orbits of Meteor-streams, deduced from Observations made during the years 1871–1880 *in Hungary.* By M. R. de Kövesligethy.

(*Communicated by Dr. N. de Konkoly.*)

For some years past observations of meteors have been made in Hungary, especially at O-Gyalla, Selmec, Zágráb, Szathmár-Némethy, Hódmezö-Vásárhely and Gyulafehérvár. There was thus a considerable amount of material, about 5,000 meteors

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having been observed. The number of those, however, which were employed in the determination of the radiant points was only 1,088, the greater part of the meteors proving to be scattered, or to have been incorrectly observed. Since 91 radiant points have been deduced, each radiant is derived on an average from 12 meteors.

The calculations have been made with the formulæ published by Dr. Charles Schrader in one of the *O-Gyalla Annales*, which do not differ very much from the approximate method given by Klinkerfues.

Let $\odot$ be the ephemeridical, $\odot'$ the corrected longitude of the Sun, R the radius vector of the Earth. By assumption of parabolical velocity, that is by neglecting $\frac{1}{a}$ in the expression

$$V = \kappa \sqrt{\frac{2}{R} - \frac{1}{a}},$$

where

$$\log \kappa = 8{\cdot}2356,$$

we have the following relations :

$$\cos \eta = \cos b \sin (l - \odot'),$$

where

$$\odot' = \odot + \Delta \odot,$$

and

$$\sin \theta = m \sin \eta,$$

where

$$m = \sqrt{1 - \frac{R}{2}}.$$

$\Delta \odot$ and log m are to be taken out of the latter following table.

For the inclination we have

$$\tan i = \frac{\sin b}{\sin \eta} \tan (\eta - \theta),$$

and for the anomaly

$$\tan \frac{v}{2} = \frac{\cos i \tan (\eta - \theta)}{\tan (l - \odot') \tan \eta}.$$

Finally,

$$\pi - \text{☊} = v, \quad \text{and } \text{☊} = \begin{cases} \odot \\ 180 + \odot \end{cases} \text{ if } b \text{ is} \begin{cases} \text{negative} \\ \text{positive} \end{cases}.$$

The perihelion distance is derived by

$$q = R \cos^2 \frac{v}{2}.$$

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As a control I used

$$\cos\frac{v}{2} = \frac{\cos(\eta-\theta)}{\cos i}.$$

The motion is direct, if

$$\eta-\theta < 90°,$$

retrogade, if

$$\eta-\theta > 90°.$$

TABLE.

With the argument ⊙ we get Δ⊙ and log m.

⊙	Δ⊙	log. *m*	⊙	Δ⊙	log. *m*
0°	−0·93°	9·8502	190°	+0·95°	9·8495
10	0·97	8495	200	0·95	8501
20	0·95	8489	210	0·92	8507
30	0·92	8483	220	0·87	8512
40	0·85	8477	230	0·77	8517
50	0·75	8472	240	0·65	8522
60	0·63	8467	250	0·52	8525
70	0·50	8463	260	0·35	8528
80	0·35	8460	270	0·18	8529
90	0·18	8459	280	0·02	8530
100	0·02	8458	290	−0·17	8530
110	+0·15	8459	300	0·33	8529
120	0·32	8460	310	0·48	8526
130	0·47	8463	320	0·62	8522
140	0·62	8467	330	0·75	8518
150	0·73	8471	340	0·85	8513
160	0·83	8476	350	0·88	8508
170	0·90	8482	360	−0·90	9·8502
180	+0·93	9·8488			

The perihelia have been excluded as being of no importance for comparison.

Dr. Edmund Weiss has given a table of the comets which nearly approach the Earth's orbit. I have changed this table only by adding the elements of these comets, which are based on the Olbers-Galle Catalogue. The second column gives the comet and node in which the approximation happens, the third the time of this approximation, the fourth the distance from the Earth's orbit, and the fifth the radiant point in longitude and latitude. The data are reduced to the mean equinox of 1850.

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Catalogue of Comets which approach near to the Earth's Orbit.

No	Comet.	Time		R−r	l	b	i	π	☊	q	Motion.
1	1792, II. ☋	Jan.	5	−0·066	182·2	27·9	49·12	135·87	283·23	0·9668	R.
2	1840, I. ☊		20	+0·036	141·1	−45·5	53·08	192·20	119·95	0·6185	D.
3	1718, ☊		29	−0·042	217·6	−18·2	31·13	121·65	127·92	1·0254	R.
4	1857, I, ☋	Feb.	2	−0·028	258·3	46·3	87·93	74·73	313·15	0·7725	D.
5	1092, ☊		5	−0·012	110·1	−56·9	88·92	156·33	125·67	0·9281	D.
6	1854, IV. ☋		13	+0·015	320·7	55·0	40·90	94·40	324·47	0·7987	D.
7	1858, IV. ☋		13	+0·045	272·2	35·2	80·03	226·10	324 97	0·5543	R.
8	1862, IV. ☋	Mar.	16	+0·013	247·9	22·9	42·47	125·18	355·77	0·8032	R.
9	1683, ☊		16	−0·052	224·0	−34·5	83·78	86·52	173·28	0·5533	R.
10	1763, ☋		18	−0·026	322·4	37·7	72·57	84·95	356·28	0·4983	D.
11	1861, I. ☋	April	20	+0·002	270·6	57·0	79·75	243·37	29·92	0·9207	D.
12	1790, III. ☋		24	−0·063	328·5	33·1	63·58	274·95	35·23	0·7910	R.
13	1863, II. ☊	June	2	−0·054	338·9	−40·3	67·37	247·25	251·27	1·0682	R.
14	1684, ☊		22	−0·010	40·1	−65·8	65·80	238·87	268·25	0·9602	D.

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No.	Comet.		Time.		R−*r*	*l*	*b*	*i*	π	☊	*q*	Motion.
15	1850, I.	☋		24	−0·065	1·9	70·5	68·18	272·42	92·88	1·0815	D.
16	1864, II.	☋		27	+0·047	13·5	1·1	1·87	304·22	95·20	0·9093	R.
17	1737, II.	☋	July	29	+0·025	129·2	58·8	39·23	262·60	123·88	0·8670	D.
18	1852, II.	☊	Aug.	10	−0·013	33·6	−27·7	49·18	278·70	317·48	0·9129	D.
19	1862, II.	☊		19	−0 027	48·6	− 4·6	7·90	299·33	326·53	0·9813	R.
20	1854, III.	☊	Sept.	10	−0·018	45·8	−33·7	71·32	273·68	347·65	0·6481	R.
21	1790, I.	☋		16	−0·053	104·7	15·2	29·73	58·40	172·83	0·7473	R.
22	1763,	☊		20	+0·029	33·2	−39·0	72·57	84·95	356·28	0·4983	D.
23	1864, IV.	☋	Oct.	16	−0·044	185·6	50·1	48·87	321·70	203·22	0·7709	D.
24	1779,	☊		19	+0·022	24·5	−42·3	32·52	87·23	25·07	0·7132	D.
25	1849, I.	☋		29	−0·027	147·2	55·1	85·05	63·23	215·20	0·9597	D.
26	Biela	☋	Nov.	28	+0·011	38·7	30·6	12·55	109·13	245·85	0·8606	D.
27	1819, IV	☊	Dec.	9	+0·086	327·9	−35·2	9·02	67·32	77·23	0·8926	D.
28	1680,	☋		26	+0·050	128·6	3·4	60·67	262·82	272·15	0·0062	D.

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I consider now the influence of neglecting $\frac{1}{a}$ on the elements.

From

$$V = \kappa\sqrt{\frac{2}{R} - \frac{1}{a}}$$

we find by differentiation

$$dV = \frac{\kappa^2}{2\,a^2 V}\,da\,;$$

κ^2 being small, and a^2 large, the error in V will be but small. For the November stream, $a = 10·340$; for the August stream, $a = 22·355$. If we put, for instance, $da = 12·015$, we get $dV = 0·00015$; we can say, therefore, that, by neglecting the quantity $\frac{1}{a}$ the velocity is hardly altered.

The approximate method follows from the strict one by putting $L = \odot - 90°$, and $R = 1$, where L is defined by the equation

$$\sin(\odot - L) = \frac{0·9998}{\sqrt{2\,R - R^2}}.$$

It easily follows that

$$dL = \frac{0·9998\,(1 - R)\,dR}{(2\,R - R^2)\sqrt{2\,R - R^2 - 0·9996}}\,;$$

therefore, in the most unfavourable case, $dL = 0·0144$. The expression for the inclination is

$$\tan i = \frac{\tan\beta}{\sin(\odot - \lambda)},$$

where

$$\tan\beta = \frac{\tan b}{\sin(l - L)}\,\sin(\lambda - L)\,;$$

l and b are the latitude and longitude of the radiant point, and λ, β, the longitude and latitude of the end point of the tangent drawn to the orbit of the meteor. By substitution and differentiation we have

$$di = \frac{\tan b\,.\,\sin(\odot - \lambda)\,\sin(l - \lambda)\,dL}{\tan^2 b\,\sin^2(\lambda - L) + \sin^2(l - L)\,\sin^2(\odot - \lambda)}\,;$$

and we may put

$$di = \frac{\tan b\,\sin(\odot - \lambda)\,\sin(l - \lambda)\,dL}{\tan^2 b\,\cos^2(\odot - \lambda) + \cos^2(\odot - l)\,\sin^2(\odot - \lambda)}.$$

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If we choose for ☉, λ and l the most unfavourable possible values, we get, in the case when $b = 89°·17$, an error of $di = 1·0000$. In the two extreme cases of our calculation, the least latitude is $-0·66$, and the greatest $= 81·12$, giving respectively $di = -0·0002$ and $+0·0922$.

We determine still the error in the anomaly, which is also identical with the error of the longitude of perihelion.

By differentiation of the formula

$$p = \frac{V^2 R^2 \sin^2 \sigma}{\kappa^2}$$

with respect to V, regarding σ as independent from L, an omission of very slight importance, we get

$$dp = \frac{2\, V R^2 \sin^2 \sigma}{\kappa^2}\, dV,$$

and thus in the worst case, $dp = 0·0240$.

From the formula for the anomaly

$$e \cos v = \frac{p}{R} - 1$$

we find, regarding p as variable,

$$dv = \frac{-dp}{R\sqrt{e^2 - \left(\frac{p}{R} - 1\right)^2}};$$

so that the greatest value of $dv : da = -0·1580$. The longitude of the node is determined only by the longitude of the Sun; the supposition $\frac{1}{a} = 0$ has no influence on it.

These few data show sufficiently that the calculation with the approximate formulæ introduces errors which are less than the errors of observation.

In a series of observations there frequently occur meteors which might with equal justice be reckoned as belonging to different radiant points. It is therefore of the greatest importance to note that meteors belonging to different streams are essentially different in colour, in the character of their trains, and in their apparent velocity. It is to be remarked that these differences form the characteristics of the meteor-streams. The Perseids are, for instance, yellow, the trains disappear rapidly, and their brightness continually increases. The following elements are arranged according to the longitude of the radiant point, which allows a better comparison and view. Our purpose is, not to record as many radiant points as possible, but to reduce the many observations to the best determined ones: as, however, among the radiant points from which I have calculated there may possibly still be some uncertainties, I give the following table of identical radiant points and meteor-streams:—

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Identical Radiant Points and Meteor Orbits.

Time.	Central No.	No. of Meteors.
1875, July 27·48	2	10
1878, 29·44	3	9
1872, Aug. 12·01	9	11
1875, 10·96	10	10
1874, 9·95	7	10
1872, Aug. 7·42	1	9
1875, 9·99	2	6
1879, July 26·96	1	10
1875, 26·96	1	18
1874, Aug. 12·45	10	7
1872, 10·98	6	9
1872, Aug. 10·98	5	8
1877, 12·93	2	19
1880, July 29·99	9	13
1878, 26·43	1	10
1875, July 28·45	2	23
1876, 27·98	2	9
1873, July 27·99	2	13
1880, 27·95	11	13
1874, Aug. 12·45	9	9
1875, 12·41	12	6
10·96	8	8
12·96	9	14
1871, 9·97	2	7
1878, Apr. 20·94	1	6
1874, 20·63	1	6

Time.	Central No.	No. of Meteors.
1874, Aug. 9·95	6	11
1874, 9·95	5	8
1875, 10·96	7	9
11·95	3	23
1876, 10·92	4	11
1875, Aug. 10·96	5	11
1874, 9·95	3	50
1876, July 27·98	4	14
27·98	1	17
1873, 26·48	1	8
1874, Aug. 9·95	2	9
1876, 13·40	2	6
1876, Aug. 10·92		15
1875, 8·93	1	9
1880, Aug. 9·44	7	22
1875, 10·96	6	14
1872, 10·98	4	8
1874, 9·95	4	25
1879, 11·94	3	12
1875, 11·95	2	12
1874, Aug. 9·95	1	14
1877, 13·44	1	12
1872, 12·42	11	9
1876, 10·92	1	9
1872, Aug. 10·98	8	12
9·97	3	16
1872, Aug. 12·42	13	9
1879, 12·46	5	13
1876, Aug. 10·92	6	16
1872, 12·01	10	22

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Time.		Central No.	No. of Meteors	l	b	i	π	Ω	q	Motion.	η	$\eta-\theta$	Station.
1880, July	9·42	10	7	358·98	44·13	15·43	297·41	287·43	1·0093	D.	47·13	16·20	Selmec.
1875,	27·48	2	10	358·03	22·06	56·48	45·15	303·95	0·4091	R.	138·33	110·52	„
1876,	27·98	3	13	357·99	48·04	84·85	247·91	305·17	0·7823	D.	122·00	85·48	O-Gyalla.
1878,	29·44	3	9	357·15	18·16	53·24	60·27	306·03	0·2992	R.	137·36	108·97	„
1872, Aug.	12·01	9	11	356·60	72·17	55·93	295·30	319·50	0·9683	D.	100·49	56·79	„
1880,	9·44	8	8	353·65	37·98	74·50	227·19	317·07	0·5074	D.	117·60	79·10	„
1875,	10·96	10	10	352·72	56·63	63·28	265·99	317·85	0·8195	D.	108·05	66·15	„
1874,	9·95	7	10	352·46	57·36	63·33	266·64	317·10	0·8292	D.	107·96	66·03	„
1875, July	31·98	7	9	347·82	33·20	82·69	209·05	308·27	0·4250	D.	121·86	85·27	„
1872, Aug.	10·98	6	9	344·24	66·19	54·10	282·67	318·53	0·9172	D.	99·87	56·08	„
1875, July	28·45	2	23	335·40	60·02	58·97	258·60	304·92	0·8582	D.	104·50	61·71	„
1873,	27·99	3	10	330·26	15·65	44·79	172·57	305·37	0·1627	D.	113·53	73·49	„
1875,	31·98	5	6	328·62	45·60	52·81	235·71	308·27	0·6595	D.	103·79	60·83	„
1872, Aug.	7·42	1	9	326·10	59·10	46·78	268·66	315·08	0·8564	D.	95·36	51·00	„
1875, July	31·98	6	9	325·71	32·50	45·50	214·37	308·27	0·4729	D.	104·27	61·42	„
Aug.	9·99	2	6	322·50	48·95	40·77	257·76	316·88	0·7670	D.	93·31	48·78	„
1880,	9·44	6	7	320·62	22·43	23·13	230·07	317·07	0·5334	D.	92·75	48·20	„
1879, July	26·96	1	10	319·22	22·96	36·20	196·80	303·52	0·3617	D.	104·08	61·21	„
1875,	26·96	1	18	316·51	12·96	20·96	190·28	303·48	0·3077	D.	102·33	59·07	Zágráb.

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Time.	Central No.	No. of Meteors.	l	b		π	Ω	q	Motion.	η	$\eta-\theta$	Station.
1874, Aug. 12·45	10	7	319·96	70·02	41·23	292·74	319·52	0·9584	D.	87·55	42·97	O-Gyalla.
1872, 10·98	5	8	306·45	47·09	29·54	270·33	318·53	0·8444	D.	81·41	37·42	„
1875, July 28·45	1	9	305·10	73·58	44·17	281·68	304·92	0·9740	D.	89·94	45·37	„
1877, Aug. 12·93	2	19	303·47	32·10	19·33	266·71	320·17	0·8080	D.	75·40	32·57	Zágráb.
1876, July 27·98	2	9	302·87	66·54	41·91	272·99	305·17	0·9372	D.	88·93	44·37	O-Gyalla.
1875, 31·98	4	7	296·83	15·23	10·85	241·05	308·27	0·7036	D.	78·54	35·09	„
1878, 29·44	1	9	293·65	53·12	32·51	263·07	306·03	0·8760	D.	82·36	38·30	„
1873, 27·99	2	13	277·21	40·82	20·38	266·37	305·37	0·9018	D.	68·79	27·92	„
1880, 29·99	9	13	270·00	77·55	37·96	294·82	307·10	1·0035	D.	84·46	38·38	Fehérvár.
1878, 26·43	1	10	269·52	73·06	35·98	295·39	303·17	1·0108	D.	80·62	36·82	Selmec.
1877, Aug. 12·93	1	18	269·13	23·76	8·72	296·07	320·17	0·9687	D.	44·13	14·84	Zágráb.
1875, 10·96	9	14	268·25	74·05	34·02	306·17	317·85	1·0028	D.	77·82	34·46	O-Gyalla.
1871, 9·97	2	7	267·27	71·64	32·47	303·83	316·85	1·0001	D.	76·00	33·04	„
1874, April 20·63	2	7	267·11	56·54	78·58	172·14	210·28	0·8980	D.	117·80	79·21	„
1880, July 27·95	11	13	260·17	47·08	19·69	280·38	305·18	0·9689	D.	60·98	23·13	Selmec.
1874, Aug. 12·45	9	9	250·44	81·12	37·60	315·74	319·52	1·0120	D.	81·68	37·64	O-Gyalla.
1878, Apr. 21·44	1	10	245·83	45·93	69·66	138·30	211·10	0·6513	D.	113·89	73·76	Vásárhely.
1875, Aug. 12·41	12	6	244·74	70·88	29·66	314·12	319·18	1·0110	D.	71·56	29·76	O-Gyalla.
10·96	8	8	220·73	73·85	31·52	320·17	317·85	1·0130	D.	74·00	31·54	„

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Time.	Central No.	No. of Meteors.	l	b		π	Ω	q	Motion.	η	$\eta-\theta$	Station.
1876, Aug. 13·93	1	10	178·75	63·82	30·24	343·71	321·35	0·9742	D.	74·74	32·07	O-Gyalla.
1878, Apr. 20·94	1	6	174·98	64·25	30·72	187·70	210·60	0·9654	D.	75·68	32·58	„
1874, 20·63	1	6	168·91	71·69	33·77	198·62	210·28	0·9948	D.	78·24	34·58	„
1880, Nov. 28·61	12	7	113·26	14·99	56·76	197·23	66·73	0·1728	R.	134·05	103·27	Selmec.
1871, Aug. 9·97	1	9	106·60	62·82	58·25	357·97	316·85	0·8884	D.	103·54	60·48	O-Gyalla.
1874, 9·95	6	11	81·79	42·37	85·35	254·04	317·10	0·7360	R.	127·71	93·96	„
1876, 10·92	5	15	79·65	53·91	82·76	358·89	318·47	0·8922	D.	120·47	83·21	Vásárhely.
1874, 9·95	5	8	75·80	45·68	85·10	267·80	317·10	0·8370	R.	128·04	94·45	O-Gyalla.
1875, 10·96	7	9	72·15	45·07	81·52	274·59	317·85	0·8758	R.	130·28	97·88	„
11·95	3	23	64·20	32·45	57·41	281·40	318·80	0·9090	R.	144·65	120·66	Szathmár.
1876, 10·92	4	11	63·33	40·49	70·13	288·07	318·47	0·9434	R.	137·49	109·15	Vásárhely.
1875, 8·93	1	9	62·31	57·24	84·43	335·73	315·83	0·9837	D.	121·36	84·51	O-Gyalla.
10·96	5	11	61·67	46·68	79·40	293·79	317·85	0·9682	R.	131·90	100·37	„
1874, 9·95	3	50	60·59	47·53	80·57	339·92	317·10	0·9734	R.	131·16	99·24	„
1880, 9·44	7	22	60·37	36·13	62·64	287·07	317·07	0·9450	R.	141·99	116·36	„
1875, 10·96	6	14	59·78	32·26	55·90	288·93	317·85	0·9502	R.	146·00	122·87	„
1872, 10·98	4	8	59·23	39·60	67·43	296·35	318·53	0·9758	R.	129·36	112·13	„
1874, 9·95	4	25	56·32	39·00	66·14	297·84	317·10	0·9848	R.	140·21	113·50	„
1879, 11·94	3	12	55·08	36·29	61·09	305·11	318·73	0·9988	R.	143·32	118·51	„

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Time.	Central No.	No. of Meteors.		b		π	☊		Motion.	η	η − θ	Station.
1875, Aug. 11·95	2	12	54·04	32·10	54·29	306·84	318·80	1·0023	R.	147·60	125·49	Szathmár.
10·96	11	15	52·72	66·93	72·71	321·33	317·85	1·0125	D.	113·00	72·72	O-Gyalla.
10·96	4	15	51·43	39·89	85·00	29·17	317·85	0·6690	R.	127·78	94·06	,,
1876, 10·92	3	9	49·80	48·40	80·09	317·17	318·47	1·0133	R.	131·60	99·91	Vásárhely.
1874, 9·95	2	9	47·61	33·48	56·28	317·28	317·10	1·0132	R.	146·52	123·72	O-Gyalla.
1876, 13·40	2	6	46·96	32·40	54·78	332·51	320·87	1·0025	R.	147·30	125·00	Vásárhely.
July 27·98	4	14	46·28	66·62	72·64	296·41	305·17	1·0102	D.	112·95	72·69	O-Gyalla.
27·98	1	17	43·38	57·19	86·17	315·15	305·17	1·0078	D.	122·48	86·18	,,
1879, Aug. 13·92	4	22	42·58	28·72	49·36	344·39	320·67	0·9700	R.	150·10	129·60	,,
1873, July 26·48	1	8	39·84	57·63	85·73	311·03	303·45	1·0106	D.	122·17	85·74	,,
1876, Aug. 13·40	1	8	37·77	49·43	83·69	343·73	320·87	0·9730	R.	129·18	96·18	Vásárhely.
1875, July 28·45	3	7	37·58	74·28	63·20	306·06	304·92	1·0152	D.	105·70	63·20	O-Gyalla.
1872, Aug. 10·98	7	26	35·08	66·84	71·85	307·27	318·53	1·0035	D.	112·43	71·94	,,
1874, 9·95	1	14	31·96	35·64	62·95	354·30	317·10	0·9102	R.	141·48	115·54	,,
1877, 13·44	1	12	30·17	42·60	76·42	2·27	320·63	0·8845	R.	133·39	102·68	,,
1879, July 26·96	2	8	29·49	42·67	71·31	315·56	303·52	1·0138	R.	137·14	108·63	,,
1872, Aug. 12·42	11	9	28·79	38·68	70·78	7·02	319 88	0·8510	R.	136·49	107·56	,,
1874, 9·95	8	28	26·68	47·06	82·96	86·16	317·10	0·9130	R.	129·50	96·68	,,
1876, 13·40	3	8	25·63	52·36	87·24	283·77	320·87	0·9102	D.	123·33	87·38	Vásárhely.

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Time.		Central No.	No. of Meteors.	l	b	i	π	Ω	q	Motion.	η	$\eta-\theta$	Station.
1876, Aug.	10·92	1	9	24·30	35·97	68·48	14·93	318·47	0·7865	R.	137·30	108·86	Vásárhely.
1872,	10·98	8	12	20·15	53·87	83·69	279·79	318·53	0·9018	D.	121·05	84·05	O-Gyalla.
1875,	11·95	1	22	20·13	8·92	20·93	54·90	318·80	0·4527	R.	149·52	128·64	Szathmár.
1872,	9·97	3	16	19·99	53·27	84·86	278·92	317·58	0·9024	D.	121·81	85·15	O-Gyalla.
1872, Nov.	28·90	1	10	18·50	66·14	27·23	55·08	66·98	0·9758	D.	69·70	27·82	"
1872, Aug.	12·42	13	9	18·45	43·16	84·65	18·66	319·88	0·7686	R.	128·18	94·66	"
1875, July	27·48	1	12	18·44	57·36	84·30	284·15	303·95	0·9850	D.	121·25	84·39	Selmec.
1872, Oct.	24·32	1	13	17·47	64·87	36·42	1·04	31·18	0·9264	D.	83·85	39·01	O-Gyalla.
1872, Aug.	12·42	12	6	16·87	64·38	69·50	231·62	319·88	0·9540	D.	111·10	70·14	"
1879,	12·46	5	13	11·87	39·73	85·92	32·28	319·32	0·6550	R.	127·27	93·28	Fehérvár.
1876,	10·92	2	8	7·34	−0·66	2·66	359·35	138·47	0·1236	R.	138·29	110·42	Vásárhely.
1875,	9·99	3	20	7·08	59·87	70·87	277·76	316·88	0·9000	D.	112·48	72·01	O-Gyalla.
1876,	10·92	6	16	6·19	41·74	86·37	243·99	318·47	0·6423	D.	123·14	87·11	Vásárhely.
1872,	7·42	2	7	5·98	50·07	80·95	259·48	315·08	0·7930	D.	119·63	81·00	O-Gyalla.
1872,	12·01	10	22	1·46	48·55	74·22	254·42	319·50	0·7198	D.	115·93	76·74	"